EFFECTIVENESS OF SENSORY MOTOR THERAPY FOR DYSPRAXIA AMONG LEARNING DISABLED CHILDREN

A PROJECT WORK SUBMITTED IN PARTIAL FULFILLMENT

OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF OCCUPATIONAL THERAPY

(ADVANCED O.T. IN PAEDIATRICS)

Submitted By

Reg.No. 411313053

JKK MUNIRAJAH MEDICAL RESEARCH FOUNDATION
COLLEGE OF OCCUPATIONAL THERAPY
KOMARAPALAYAM - 638 183.

Affiliated To

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY,
CHENNAI - 600 032.

OCTOBER 2016

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PRINCIPAL **EXTERNAL EXAMINER**

GUIDE **INTERNAL EXAMINER**

CERTIFICATE

This is to certify that the Project work entitled studies on the "**EFFECTIVENESS OF SENSORY MOTOR THERAPY FOR DYSPRAXIA AMONG LEARNING DISABLED CHILDREN"** is a bonafide compiled work carried out by ***Reg.No.*** **411313053** Final year student, College of Occupational Therapy under J.K.K. Munirajah Medical Research Foundation, Komarapalayam - 638 183, in partial fulfillment for the award of Degree of **"Master of Occupational Therapy"** of **The Tamilnadu Dr.M.G.R.Medical University, Chennai - 32**. This work was guided and supervised by **Mr. JEGADEESAN, MOT.,** at the Department of Occupational Therapy, ***JKKMMRF, Komarapalayam.***

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ABSTRACT

OBJECTIVES

The purpose of this study is to evaluate the Effectiveness of Sensory Motor Therapy for dyspraxia among learning disabled children**.**

METHODS

Totally 30 subjects (15 in experimental group and 15 in control group) of the age group 6-9 years, participated in the current study. The experimental group underwent sensory motor therapy for dyspraxia. Statistical "t" test give us the processed results**.**

RESULTS

Statistical calculated scores shows improvement in praxis through sensory motor therapy among learning disabled children.

CONCLUSION

There is significant effect in using sensory motor therapy in improving praxis among learning disabled children.

KEY WORDS

Dyspraxia, Sensory motor therapy, learning disability**.**

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INTRODUCTION

In the 1940 s, a child who had normal measured intelligence but could not learn in a circumscribed area of academics was simply called an under achiever or labeled emotionally disturbed. In the 1950 s a child with this problem was more typically labeled as having minimal brain damage or minimal brain dysfunction. Educationally handicapped or learning disabled are the terms most likely to be used to classify these children today.

In India around 13-14% of all school children suffer from learning disorders[23]. Unfortunately most children go unnoticed. However the past decade has witnessed a sudden spurt in the recognition of learning disabilities. This sensitivity has benefited some children who have to cope with the invisible learning disability. Learning disabilities are heterogeneous with different manifestations.

According to Jean Ayres, learning disabled children with motor planning problems come under the category of dyspraxia[3]. In her earlier writings, Ayres used the term apraxia to refer to developmental dyspraxia. She believes the term dyspraxia is better suited for the child who can formulate motor plans but who is slow & inefficient in doing so.

Developmental co-ordination disorder (DCD) or developmental dyspraxia occurs when a delay in the development of motor skills or difficulty coordinating movements results in a child being unable to perform everyday tasks[21].

DCD is believed to affect 6-13% of school-aged children[13]. When dyspraxia is associated with learning disability, the children may have weaknesses in comprehension, information processing and listening. As a result they will have low self-esteem, depression and other emotional and behavioral issues.

Occupational therapists have a major role to play in the treatment of dyspraxia. The purpose of the study is to examine the effectiveness of sensory motor therapy on dyspraxia. The study clearly reveals the investigator's interest in the field of sensory motor therapy.

AIM & OBJECTIVES

AIM OF THE STUDY

To study the effectiveness of sensory motor therapy for dyspraxia among learning disabled children**.**

OBJECTIVES

- To screen learning disabled children using "Teacher's questionnaire for children with learning problems".
- To assess dyspraxia among those children using "BRUININKS TEST OF MOTOR PROFICIENCY- BRIEF FORM"
- To evaluate the effectiveness of sensory motor therapy for dyspraxia**.**

HYPOTHESIS

NULL HYPOTHESIS

There will be no effectiveness of sensory motor therapy on dyspraxia among learning disabled children.

ALTERNATE HYPOTHESIS

There will be effectiveness of sensory motor therapy on dyspraxia among learning disabled children.

REVIEW OF LITERATURE

Mats Niklasson,Irene niklasson, (2009) examined the effects of sensory -motor therapy on increasing sensory motor proficiency of children with attention and motor difficulties. The sensory-motor therapy utilized the training program, retraining for balance on sensory-motor proficiency. The treatment program was close to 3 years. The program has seven parts, including foetal &neonatal movements, vestibular &auditory perceptual stimulation and gross motor movements among others. Retraining for balance was found to be a functional technique for training children and youth with sensory-motor difficulties &might constitute a complement to regular treatment of DCD, learning disability & ADHD.

Joan Vertes (2006), studied the effects of small group treatment model to sensory motor approach on enhancing the physical skills of children with DCD. The program addresses current pressures experienced by occupational therapists, children and families. Groups may contain 2-6children &are provided weekly for 1 hr in blocks of 6-8 sessions. Sessions consist of a) warm up activities b) warm up & organizing games on suspended equipment c) combination of fine motor and visual motor activities while at a board, lying on the carpet or sitting at a table. Results showed improvement in the physical skills.

Winnie W.Y Hung, Msc &Marco Y.C. Pang PhD (2010), examined the effects of group-based versus individual-based exercise training on motor performance in children with DCD. It was a pilot study.23 children (4 girls)with developmental co-ordination disorder were taken for the study.12 children were randomly assigned to undergo a motor training programme once a week for 8 consecutive weeks in a group setting &11 children received the same training on an individual basis during the same period. The authors concluded that group- based training produced similar gains in motor performance to individual-based training. Group- based training may be the preferred treatment option due to cost savings.

Joan Vertes Bsc, OT, Emily S. Ho, Bsc, OT,Stephanie Hadi, Bsc, Msc, OT did a research on parental perceptions of group based occupational therapy. The purpose of this article is to describe a novel approach to a group based sensory motor therapy program that entailed using a one way mirror &parental feedback regarding their participation &that of their children. A retrospective view of a preliminary program evaluation of a group-based sensory motor program was conducted. Parents were asked to rate components of the program on a 5 point ordinal scale &qualitatively list the perceived benefits of the group for the child &for themselves. 43 parents completed the questionnaire. The

respondents' mean satisfaction was excellent. Parental involvement in group based sensory motor therapy is beneficial for them &their children.

L. Gabriels, John A.Agnew, (2012) examined the effects of 10 weekly lessons of therapeutic horseback riding on 42 participants diagnosed with an autism spectrum disorder. All participants received base-line & post-condition assessments in the areas of self- regulation, adaptive living skills and praxis skills. Bruininks-oseretsky test of motor proficiency- Brief form was used to assess the praxis skills of the participants..

John Cairney, John Hay, (2010) did a research on Trajectories of cardio respiratory fitness in children with & without developmental coordination disorder**.** The short form of Bruininks-0seretsky test of motor proficiency was used to identify children with DCD.

John Cairney, PhD (2010) conducted a study on Trajectories of relative weight and waist circumference among children with and without developmental coordination disorder . Motor coordination was evaluated using the short form of BOT-2.The short form was administered against the long form of the test, with correlations between 90 & 91 among children aged 8-14 years.

John Cairney, (2007) evaluated the CSAPPA sub-scales as potential screening instruments for developmental co-ordination disorder. The objective of the study was to assess the potential of three sub-scales of the Children's self-perceptions of adequacy in & predilection toward physical activity, (CSAPPA), a measure of generalized self- efficacy, as possible screens for developmental co-ordination disorder. Bruininks-oseretsky test of motor- proficiency short form(BOTMP- sf) was used to identify probable cases of DCD.

Hay, J; Cairney, J; Veldhuizen, S (**2009)** have compared the probable case identification of developmental co-ordination disorder using the short form of the Bruininks- Oseretsky Test of Motor Proficiency and the Movement ABC. This paper reports the results of case identification using the Movement Assessment Battery for children (MABC) in a group of children scoring below the sixth percentile on the BOTMP-SF. The conclusion of this research is that "The BOTMP-SF seems to be a reasonable alternative to case identification when clinical assessment with the MABC is not feasible.

Raghu Lingam MBChB, Linda Hutt, PhD, did a research to calculate the prevalence of developmental co-ordination disorder at 7 years of age by using Diagnostic and Statistical Manual of Mental Disorders fourth edition. The motor coordination of >7000 children was

assessed by using tests that measured manual dexterity, ball skills & balance. The 5th percentile of the derived Avon Longitudinal Study of parents and children coordination impairment score was used to define severe motor coordination difficulties. Complete data were available from 6990 children aged 7-8 years who attended the coordination session & completed the writing test or activities of daily living scale.123 children met criteria for developmental coordination disorder. The results showed that there is a prevalence of DCD in 18 of 1000 children at a mean age of 7.5 years.

Holsti, Liisa M.A., O.T conducted a study on developmental coordination disorder in extremely low birth weight children. This study describes the prevalence of DCD in a cohort of extremely low birth weight children at 8.9 years of age, from which were excluded children with major impairments. 73 children were included in the study group, along with 18 term- born, socially matched controls. Of the 73 ELBW children, 37 (51%) were classified as having DCD.

John Cairney PhD,John A. Hay PhD, evaluated the link between DCD and physical activity. Motor proficiency was evaluated using Bruininks-Oseretsky test of motor proficiency -Short form (sf).

RELATED LITERATURE

LEARNING DISABILITY

Definition

The term" learning disability" was used in 1962 by Samuel A.Kirk in his textbook "Educating exceptional children".

"Learning disability is a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical abilities".

Etiology

- Genetic predisposition
- Perinatal injury(e.g., complications during pregnancy)
- Neurological conditions (e.g., head injuries, serious falls, concussions, prolonged fever)
- Environmental factors (e.g.,neglect, abuse, disorganised home).

Incidence

In the united states department of education, about 1.75 million or about 4.4 % of the approximately 40 million children enrolled in public school have specific learning disabilities. The condition is 5 times more common in boys than girls. In India, around 13-14% of all school children suffer from learning disorders.

DSM-4 CRITERIA OF LEARNING DISABILITY

- The individual's achievement on individually administered , standardized tests in reading, mathematics or written expression are substantially below that expected for age, schooling and level of intelligence.

- The learning problems in criterion a significantly interfere with academic achievement or activities of daily living.

- If a sensory deficit is present, the difficulties in the particular skill area (e.g., reading, writing, math) must be in excess of those usually associated with the deficit.

PRE-SCHOOL SIGNS AND SYMPTOMS OF LEARNING DISABILITIES

- Problems pronouncing words
- Trouble finding the right word
- Difficulty rhyming
- Trouble learning the alphabet, numbers, colours, shapes, days of the week.
- Difficulty following directions or learning routines
- Difficulty controlling crayons, pencils& scissors or colouring with the lines.
- Trouble with buttons, zippers or learning to tie shoes.

AGES 5-9 SIGNS & SYMPTOMS OF LEARNING DISABILITIES

- Trouble learning the connection between letters & sounds.
- Confuses basic words when reading
- Consistently misspells words &makes frequent reading errors
- Trouble learning basic math concepts

- Difficulty telling time
- Slow to learn new skills

AGES 10-13

- Difficulties with reading comprehension or math skills
- Trouble with open-ended questions
- Dislikes reading & writing; avoids reading aloud
- Poor organisation skills
- Trouble following classroom discussions & expressing thoughts aloud
- Poor handwriting

TYPES OF LEARNING DISABILITY

- Dyslexia
- Dysgraphia
- Dyspraxia
- Dysphasia
- Dyscalculia

DYSLEXIA

The essential feature of dyslexia is that reading achievement [i.e., reading accuracy, speed or comprehension as measured by individually administered standardized tests] falls substantially below that expected given the individual's chronological age, measured intelligence & age appropriate education.

Signs of reading difficulty

- Problems with letter & word recognition
- Problems in understanding words & ideas
- Problems with reading speed & fluency
- Problems in general vocabulary

DYSGRAPHIA

The writing skills as measured by individually administered standardised tests are substantially below that expected given the individual's chronological age, measured intelligence and age appropriate education.

Signs of dysgraphia:

- Problems with neatness & consistency of writing
- Problems in accurately copying letters & words
- Spelling inconsistency
- Problems in writing organisation and coherence

DYSCALCULIA

Mathematical ability, as measured by individually administered standardized tests is substantially below that expected given the individual's chronological age, measured intelligence and age appropriated education.

Signs of dyscalculia:

- Problems in memorization & organisation of numbers
- Problems in using operation signs

DYSPHASIA:

It is an inability to associate meaning with words .Receptive dysphasia indicates a disorder in understanding spoken language. Expressive dysphasia is a disorder in using language for effective oral

communication. Dysphasia is a speech disorder in which there is an impairment of speech and of comprehension of speech.

Signs of dysphasia:

- ❖ Has difficulty gaining meaning from spoken language
- ❖ Demonstrates poor written output
- ❖ Exhibits poor reading comprehension
- ❖ Shows difficulty expressing thoughts in verbal form
- ❖ Is often frustrated by having a lot to say and no way to say it
- ❖ Feels that words are "right on the tip of my tongue"
- ❖ Can describe an object and draw it but can't think of the word for it
- ❖ Has difficulty getting joke

DYSPRAXIA

A child with dyspraxia can present with a wide spectrum of difficulties. The term is, however, used to describe co-ordination difficulties with evidence of significant perceptual problems in the majority of cases. The term dyspraxia is taken from the Greek word duspraxia.. Duspraxia is formed of dus (or dys) and praxia(or praxis which is taken from an older Greek word prassein).Praxis is to practice an

act or a function, pass through, experience; therefore "to act". Dys means impaired, ill or abnormal, so the literal meaning of dyspraxia is ill-doing or abnormal act.

Developmental dyspraxia is an immaturity of the organization of movement. The brain does not process information in the way that allows the full transmission of neural messages. A child with dyspraxia will find it hard to plan what to do and how to do it. Dyspraxia is also known as Developmental Co-ordination Disorder (DCD), Perceptual-Motor Dysfunction, and Motor Learning Difficulties. The terms Clumsy Child Syndrome or Minimal Brain Damage are no longer used.

Children and adults with dyspraxia find it difficult to learn how to plan and co-ordinate their movements. The condition is therefore also known as a "motor learning disability". Someone with dyspraxia will find it hard to carry out smooth and coordinated movements because the simultaneous perceptual and motor processes of carrying out an act successfully is a complex task that requires conscious imaging, planning, positioning, balance, muscle activation and co-ordination.

Dyspraxia often comes with language problems and sometimes with a degree of difficulty with perception and thought. Dyspraxia does not affect a person's intelligence, but it can cause difficulties with learning, especially for children.

What Causes Dyspraxia?

For the majority of people with dyspraxia there is no known cause. Current research suggests that it is due to an immaturity of neuron development in the brain. It is not a result of brain damage and people with dyspraxia have no clinical neurological abnormality that would explain the condition.

When considering the brain, the cerebral cortex (the upper most part of the brain) receives impulses from sensory organs through a network of nerve fibres passing from the brain stem. As a child grows and learns, the connections between the nerve cells (neural pathways) become established and reinforced with successful learning. When a child learns a series of movement patterns, the repetition of movement reinforces the pattern so that its planning is almost reflex. The use of external sensory input such as sight and sound together with the learned movement patterns will enable the cerebral cortex to judge the best course of action and send out appropriate motor impulses.

The cerebral cortex is divided into a right hemisphere and a left hemisphere. Each side has different functions and operates quite separately. Some functions are shared but the sides generally work independently to provide its information that is brought together to complete the whole picture e.g. the left hemisphere receives the

information in a jumbled, disjointed way and needs to work well together with the right hemisphere so that the information, images and actions are interpreted correctly for the right results.

In children with dyspraxia, the two hemispheres of the cerebral cortex are not working in harmony to produce the desired results. The basic development of the hemispheres appear reduced and as they determine whether a person is right or left handed, you will often find that children with dyspraxia will use both hands without developing a dominant hand for some time. This affects fine motor activities even further e.g. handwriting skills.

The cerebral cortex also surrounds the "thalamus", "hypothalamus" and "pituitary gland of the limbic system. The limbic system is responsible for the instinctive and automatic responses of the body and it is closely linked to emotional behavior. A mature cerebral cortex would be able to dampen down the limbic system's emotional response to external stimuli. If the cerebral cortex does not mature as expected, the individual would be excitable, over emotional and extremely sensitive to external sensory input.

CHARACTERISTIC FEATURES OF DYSPRAXIA - PLAY, DEVELOPMENTAL AND EDUCATIONAL CHARACTERISTICS

1. Clumsy-difficulty transitioning from one body position to another
2. Poor tactile discrimination
3. .Inadequate body scheme
4. Difficulty with sequencing and timing the actions involved in a motor task
5. Slow in learning activities of daily living
6. Problems in gross motor skills and sports
7. Problems in constructive or manipulative play and fine motor abilities
8. Handwriting difficulties
9. Developmental articulatory deficit
10. Accompanying soft neurological signs
11. Accompanying learning disabilities

BEHAVIOURAL CHARACTERISTICS

1. Low self-esteem, poor self concept
2. Easily frustrated, avoids new situations
3. Often manipulative
4. May prefer "talking" to "doing"
5. Often late and forgetful
6. Disorganized

A child with dyspraxia could display the following symptoms

- Late in reaching developmental milestones as a baby e.g. rolling, sitting, standing walking and speaking
- May not be able to run, hop, jump, kick a ball as their peers can
- Difficulty keeping friends or knowing how to behave in company
- Has difficulty understanding concepts such as "in", "on", "in front of" etc.
- Difficulty walking up and down stairs
- Poor at dressing

- Falls frequently
- Poor pencil grip
- very immature drawings
- Easily distressed and prone to temper tantrums
- Often bumps into things
- Hand flapping
- Difficulty pedaling a tricycle
- Lack of sense of danger (jumps from heights etc.)
- Messy eater (may prefer using hands and frequently spills drinks)
- Lack of imaginative play
- May be sensitive to sensory stimuli.

The junior and senior school child will probably continue to have the difficulties experienced by the infant school child with little improvement if their needs are not addressed by this stage. It is unlikely that major changes in their ability would occur but they can make good progress in school with understanding, support and good coping strategies. children with dyspraxia may lose self confidence and

motivation as they find school work increasingly difficult. By the time they reach secondary school their attendance record is often poor.

STANDARDISED ASSESSMENTS FOR DYSPRAXIA

- Sensory integration and praxis tests(SIPT) ,Ayres1979
- Bruininks-oseretsky test of motor proficiency, 1978
- Miller assessment for pre-schoolers, Miller (1988
- Movement assessment battery for children (Henderson &Sugden)
- Developmental test of visual- motor integration(Beery)
- Motor free visual perceptual test
- Test of visual perceptual skills (Gardener)
- Sensory profile (Winnie dunn)

OCCUPATIONAL THERAPY FOR DYSPRAXIA:

SENSORIMOTOR APPROACH

This is a tool used by occupational therapists to treat dyspraxia. This approach emphasizes active, experience-based learning. Piaget based his theories on the assumption that children learn about their bodies & their environment through their experience. Sensory integration is

regarded as an example of sensory motor approach. A sensori motor approach can also include more structured activities The term sensorimotor can also be used to refer to an approach such that as used by Rood, where a specific sensory input such as vibration is expected to produce a specific motor output.

SENSORY INTEGRATIVE THERAPY:

Occupational therapists may recommend sensory integration for dyspraxia. We provide the child with increased opportunity to take in sensory information such as touch, deep pressure, movement experiences and visual information. This sensory information provides feedback and improves body awareness as well as awareness of where the child is in space. Activities would involve planning and in doing the activities it is essential that the child is actively involved in purposeful and meaningful tasks. Treatment should also focus on those skills necessary for his/her daily life tasks such as self- care, classroom or play tasks. The occupational therapist attempts to provide activities that encourage the client to engage in tasks which challenge them slightly but are not so difficult that the client becomes frustrated or results in poor quality of movement.

PERCEPTUAL MOTOR TRAINING:

This involves improving the youngster's language, visual, movement, and auditory skills. A series of tasks which gradually becoming more advanced, are set. The goal is to challenge the youngster so that she improves but not so much that it becomes frustrating or stressful.

COGNITIVE GOAL DIRECTED APPROACH

The child is assisted in identifying, developing and using cognitive strategies to perform daily occupations effectively.

COMPENSATORY SKILL DEVELOPMENT APPROACH

This approach aims to help the child/family develop specific skills or coping strategies in the face of dyspraxia. E.g. provide the child with a weighted pen, computer scribe.

ACTIVE PLAY

Experts say that “active play” (i.e., any play that involves physical activity), which can be outdoors or inside the home, gets the motor activity going in AS(Autism spectrum)and HFA(high-functioning autism) kids. Play is a way these young people learn about the environment and about themselves (particularly for those aged 3 to 5).

Active play is where the youngster's physical and emotional learning, the development of language, special awareness, the development of what his senses are, all come together. The more these kids are involved in active play, the better they will become at interacting with others successfully.

METHODOLOGY

Research Design

The present study was two groups, pre & post quasi experimental design.

Experimental group

Pretest ---------- Post test

intervention

Control group

Pretest ---------- Post test

SAMPLING TECHNIQUE

Convenient sampling

Setting and Duration

1. Setting : JKK Munirajah school, Komarapalayam
2. Duration of study :1year

CRITERIA FOR SAMPLE SELECTION

Inclusion criteria

- Children with learning disability in the age group of 6 to 9 years
- Children who are in the below average level according to the descriptive category as in BOT - 2 (for assessing dyspraxia)
- Children with Iq 90 to 110
- Both male and female children with learning disability

Exclusion criteria

- Children with physical limitations
- Autism spectrum disorders
- ADHD
- Children with Iq below 80

SAMPLE SIZE:

- 30 subjects
- 15 subjects - Experimental group
- 15 subjects - Control group

Measurement tools

1. Teacher's questionnaire about children with learning problems

2. Bruininks - oseretsky test of motor proficiency - brief form

Teacher's questionnaire about children with learning problems:

It is a questionnaire for screening children with learning problems

Bruininks - oseretsky test of motor proficiency - brief form

The Bruininks - oseretsky test of motor proficiency is an individually administered test that uses engaging, goal-directed activities to measure a wide array of motor skills in individuals aged 4 through 21. It was designed to provide practitioners such as occupational therapists with a reliable and efficient measure of fine & gross motor skills.

Since its publication in 1978, the original BOT - MP has been widely used standardized measure of motor proficiency. Moreover, it can identify motor-skill deficits in individuals with mild to moderate motor control problems, it is easy to administer & scores, it is fun for examinees. (Many clinical research studies use the BOTMP & it is often chosen as the standard for the criterion validation of other motor ability instruments).The reliability coefficients are high ranging from the mid-

70s to mid-80s.The inter-rater reliability coefficients are very high(0.98 & 0.97)

Many research studies have also used the BOTMP to explore the nature & degree of motor - skill deficits in individuals with disorder such as developmental coordination disorder. All items from the BOT - 2 brief form originated in the BOT - 2 Complete form and were selected for clinical utility, content coverage and ease of administration. The brief form contains 12 items, consisting of at least one item from each BOT-2 subtest.(complete form)

BRIEF FORM ITEM CONTENT

Brief Form Item	Brief Form Item Name	BOT-2 Subtest	BOT-2 Number
1	Filling in a star	Fine motor precision	2
2	Drawing a line Through a path	Fine motor precision	4
3	Copying overlapping circles	Fine motor integration	3
4	Copying a Diamond	Fine motor integration	6
5	Stringing blocks	Manual dexterity	5
6	Touching nose with index fingers- eyes closed	Bilateral Coordination	1
7	Pivoting thumbs and Index fingers	Bilateral Coordination	5
8	Walking forward heel to toe on a line	Balance	5
9	One-legged side hop	Running speed and Agility	4
10	Catching a tossed ball - one hand	Upper - limb coordination	4
11	Dribbling a ball - alternating hands	Upper - limb coordination	6
12a or 12b	Knee push-ups or Full push - ups	Strength	2a or 2b

Test materials and Equipment

Each test kits contains the following materials needed to administer, score and interpret the BOT - 2 brief form.

- Manual / administration easel
- Blocks (15) and string
- Knee pad
- Tennis ball

Administration time:

The brief form will take approximately 15 to 20 minutes to administer, with an additional 5 minutes needed to tape the ten foot line on the floor. However the administration time may vary based on the examinee's age and ability, among other factors.

Method of Administration:

- Initially the researcher selected 30 children based on the inclusion criteria by convenient sampling .
- Then the BOT - 2 brief form was administered to the samples to evaluate the motor praxis by dividing them into two groups, 15

samples in the experimental group and 15 samples in the control group.

- Sensory motor therapy was given to the experimental group in the form of games. The experimental group was divided into small groups-each group consisting of 3 children. . This group underwent treatment for two sessions per week.

- After the intervention period was over, the BOT- 2 brief form was once again administered to both control and experimental groups.

- Results have been compared with statistical techniques. 't ' value was calculated to attain results.

INTERVENTION PROCEDURES

Sensory Motor therapy was given for 3 and a half month on the basis of 2 sessions / week. Totally there were 28 sessions. One session lasted for 45 minutes.

Session 1

1. Hop scotch game

2. Jumping above a tied rope (running on a tactile path)

3. Sac race

Session 2

1. Musical chair (on a tactile path)
2. Throwing ball at a target (jumping on the trampoline)
3. Monkey in the middle (on a tactile path)

Session 3

1. Filling in a bottle (running on a tactile path)
2. Jumping over the obstacles & throwing ball inside the bucket
3. Bouncing the ball on the wall & catching it on the rebound (jumping on the trampoline)

Session 4

1. Rolling a ball, retrieving it and throwing at a target (on a tactile path)
2. Criss- cross walking on a rope placed on a tactile path (throwing ball at a target)
3. Kneel- walking on a tactile path

Session 5

1. Clay activity (on a tactile path)
2. Tug of war (on a tactile path)
3. Passing the ball (one person jumping on the trampoline)

Session 6

1. Jumping above a tied rope and throwing ball to someone or at a target
2. Dash & freeze
3. Frog leap on a tactile path (transferring balls from one basket to another)

Session 7

1. Sweets in a jar (running on a tactile path)
2. Lemon on the spoon (on a tactile path)
3. Land, sea, air (on a tactile path)

Session 8

1. Child in kneeling with one arm support and rolling ball to a target with the other hand (on a tactile path)

2. Penny toss (jumping on the trampoline)

3. Bouncing the ball on the wall and catching it after one clap (jumping on the trampoline)

Session 9

1. Potato on the spoon (on a tactile path)

2. Hopping along the rope on the floor & throwing ball at a target

3. Passing the ball (one person jumping on the trampoline)

Session 10

1. Monkey game (on a tactile path)

2. Musical chair running in between the chairs (in a zig- zag fashion)

3. Catching the ball (one person jumping on the trampoline)

Session 11

1. Dash and freeze

2. Criss cross walking on a rope placed on a tactile path

3. Hop- scotch game (without landing on the other side)

Session 12

1. Jumping above a tied rope (distance decreased)
2. Throwing ball at a target- jumping on the trampoline (distance increased)
3. Filling in a bottle running on a tactile path (size of the lid decreased)

Session 13

1. Jumping over the obstacles & throwing ball inside a bucket (stop-watch used)
2. Land, sea, air (speed increased)
3. Child in kneeling with one arm support and rolling ball to a target with the other hand (on a tactile path)

Session 14

1. Bouncing the ball on the wall & catching at on the rebound (after one bounce) - jumping on the trampoline
2. Rolling a ball, retrieving it before it reaches the goal & throwing ball at a target (stop- watch set) - using tactile path of different textures
3. Kneel walking on a tactile path

Session 15

1. Clay activity (sticking full human picture)
2. Frog leap on a tactile path (number of balls increased and stop-watch used)
3. Jumping above a tied rope & throwing ball to a person or at a target (distance decreased)

Session 16

1. Potato on the spoon (on a tactile path)
2. Sweets in a jar (no. of sweets increased)
3. Tug of war (thickness of the rope increased)

Session 17

1. Dash & freeze
2. Tandem walking on a tactile path and throwing ball at a target
3. Hop-scotch game

Session 18

1. Bouncing a ball on the wall and catching it on the rebound after three claps(jumping on the trampoline)
2. Walking on toes (on a tactile path)
3. Jumping above a tied rope & throwing ball at a target immediately after jumping (time lapse noted)

Session 19

1. Hopping along the rope on the floor & returning to the starting point
2. Land, sea, air (on a tactile path)
3. Running on toes (on a tactile path)

Session 20

1. Bouncing the ball on the wall and catching it on rebound (after one clap)
2. Monkey game (on a tactile path)- distance between the players was increased.
3. Tandem walking on a rope placed on a tactile path

Session 21

1. Kneel- walking on a rope placed on a tactile path
2. Rolling a ball, retrieving it and throwing ball inside a bucket (stop-watch used)
3. Jumping above a tied rope (distance decreased)

Session 22

1. Penny toss (jumping on the trampoline)
2. Musical chair (on a tactile path)
3. Bunny hopping on a tactile path

Session 23

1. Passing a ball (one person jumping on the trampoline on one- leg)
2. Tug of war (on a tactile path)
3. Kneel walking on a tactile path (pushing a ball with the knee to a target)

Session 24

1. Sweets in a jar (size of the bottle lid decreased & time noted for opening the lid)
2. Sac race
3. Filling in a bottle

Session 25

1. Potato on the spoon
2. Dash and freeze
3. Running race (marbles in hand)

Session 26

1. Clay activity (time noted)
2. Blowing soap bubbles and bursting them (Jumping on the trampoline)
3. Penny toss (Distance increased)

Session 27

1. Hop- scotch game
2. Tug of war (on a tactile path)
3. Bouncing the ball on the wall and catching it on the rebound (after touching the knee once)

Session 28

1. Bouncing the ball on the wall and catching it on rebound (after clapping thrice)
2. Hopping on a rope placed on a tactile path and returning back without landing on the floor.
3. Running on toes.

DATA ANALYSIS AND INTERPRETATION

COMPARISON OF PRAXIS BETWEEN CONTROL AND EXPERIMENTAL GROUP PRE TEST VALUES

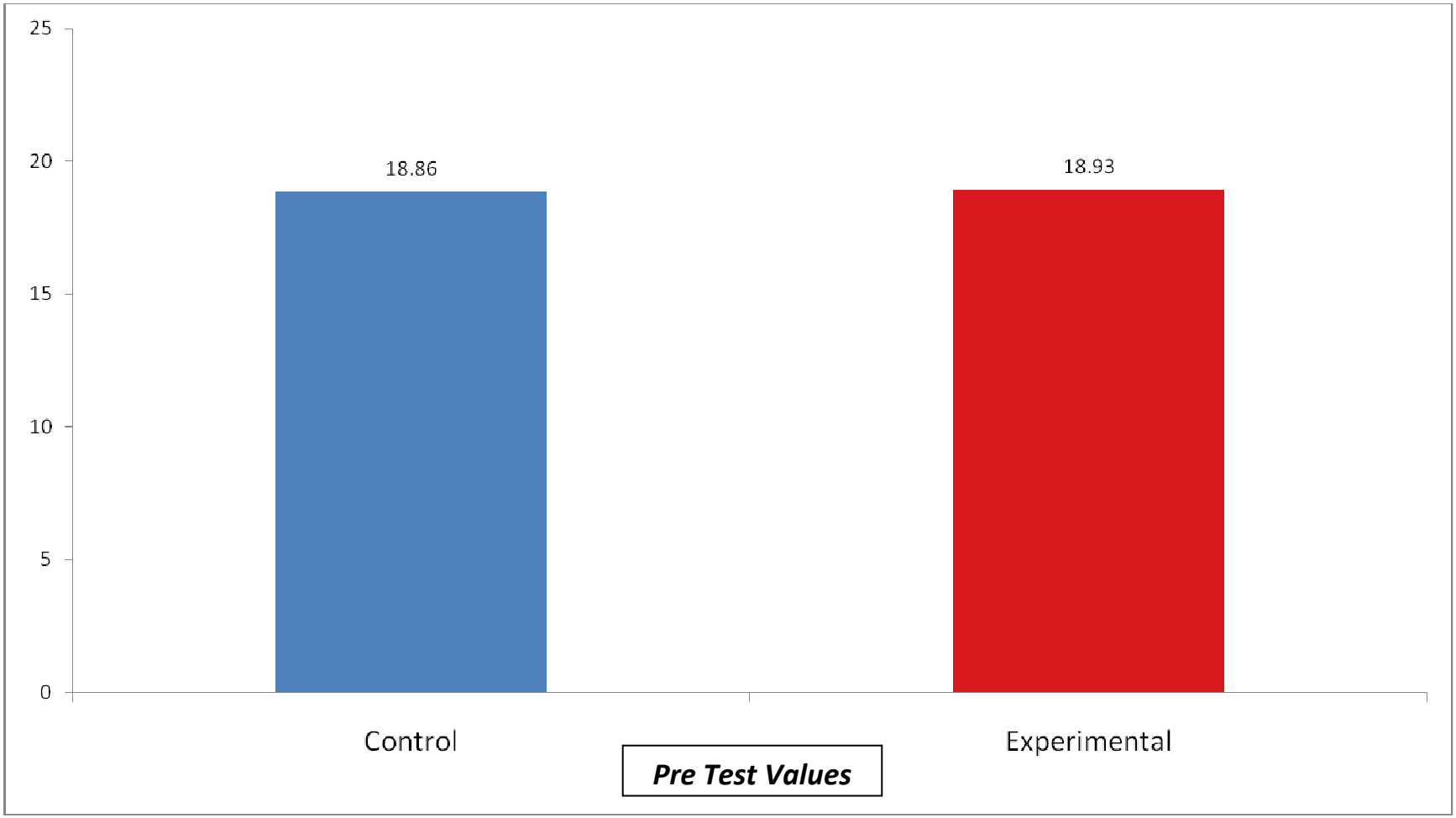
TABLE - 1

S.No.	Group	Mean	SD	"t" value	"p" value
1	Control	18.86	8.83	0.063	0.47
2	Experimental	18.93	8.21		

NS = Not Significant

Table 1 and Graph 1 show the comparison between experimental and control group- pretest values. The mean values are 18.86;18.93, "t" value is 0.063 and "p" value is 0.47 which is greater than 0.05. Therefore there is no significant difference in the pre test values of the praxis between control and experimental group.

GRAPH -I : COMPARISON OF PRAXIS BETWEEN CONTROL AND EXPERIMENTAL GROUP - PRE TEST VALUES



COMPARISON OF PRAXIS BETWEEN CONTROL AND EXPERIMENTAL GROUP - POST TEST VALUES

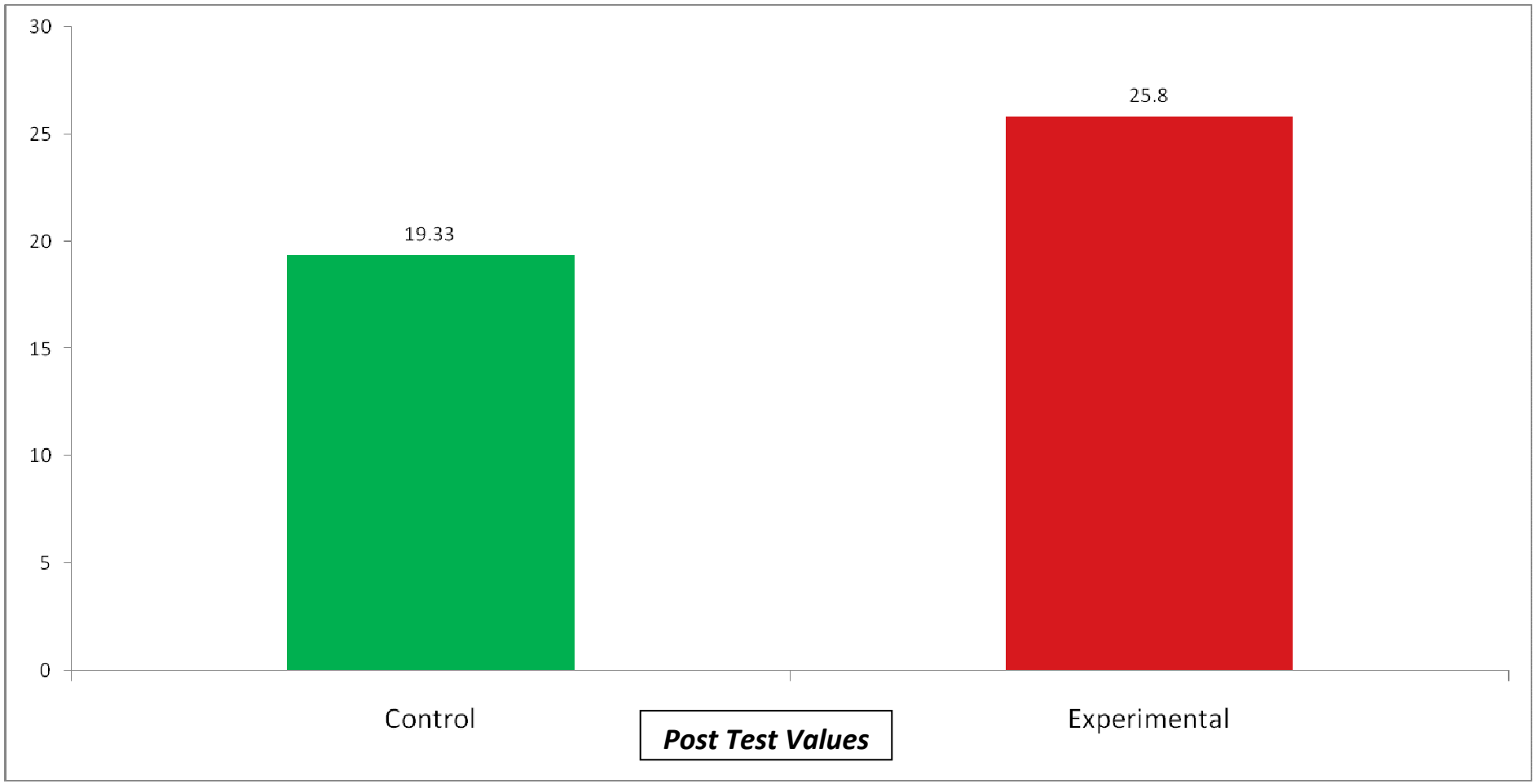
TABLE - 2

S.No.	Group	Mean	SD	"t" value	"p"value
1	Control	19.33	8.85	2.38	0.012
2	Experimental	25.8	5.63		

S = Significant

Table 2 and Graph 2 show the comparison between experimental and control group- post test values. The mean values are 19.33&25.8,"t" value is 2.38,"p" value is 0.012 which is < 0.05. Therefore there is significant difference in the post test values of the praxis between control and experimental group.

GRAPH -II : COMPARISON OF PRAXIS BETWEEN CONTROL AND EXPERIMENTAL GROUP - POST TEST VALUES



PRAXIS IN CONTROL GROUP

PRE TEST VS POST TEST VALUES

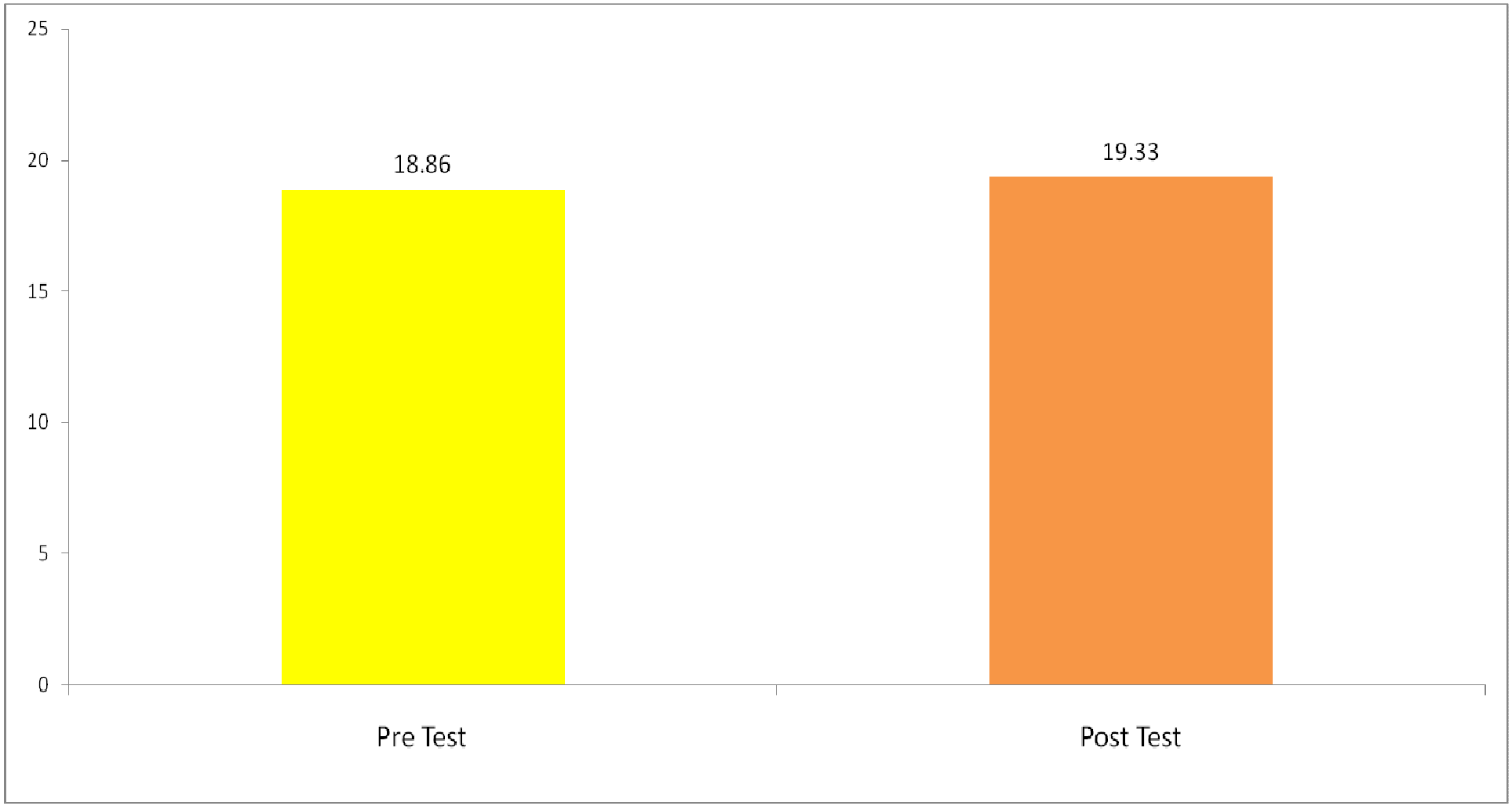
TABLE - 3

S.No.	Control Group	Mean	SD	"t" value	"p" value
1	Pre test	18.86	8.83	0.14	0.44
2	Post test	19.33	8.85		

NS = Not Significant

Table 3 and Graph 3 show the comparison between pre-test and post test values in the control group."The mean values are 18.86&19.33,"t" value is 0.14, "p" value is 0.44 which is > 0.05. Therefore there is no significant difference between pre test and post test values of the praxis in control group.

GRAPH -III : PRAXIS IN CONTROL GROUP - PRE TEST VS POST TEST VALUES



PRAXIS IN EXPERIMENTAL GROUP

PRE TEST VS POST TEST VALUES

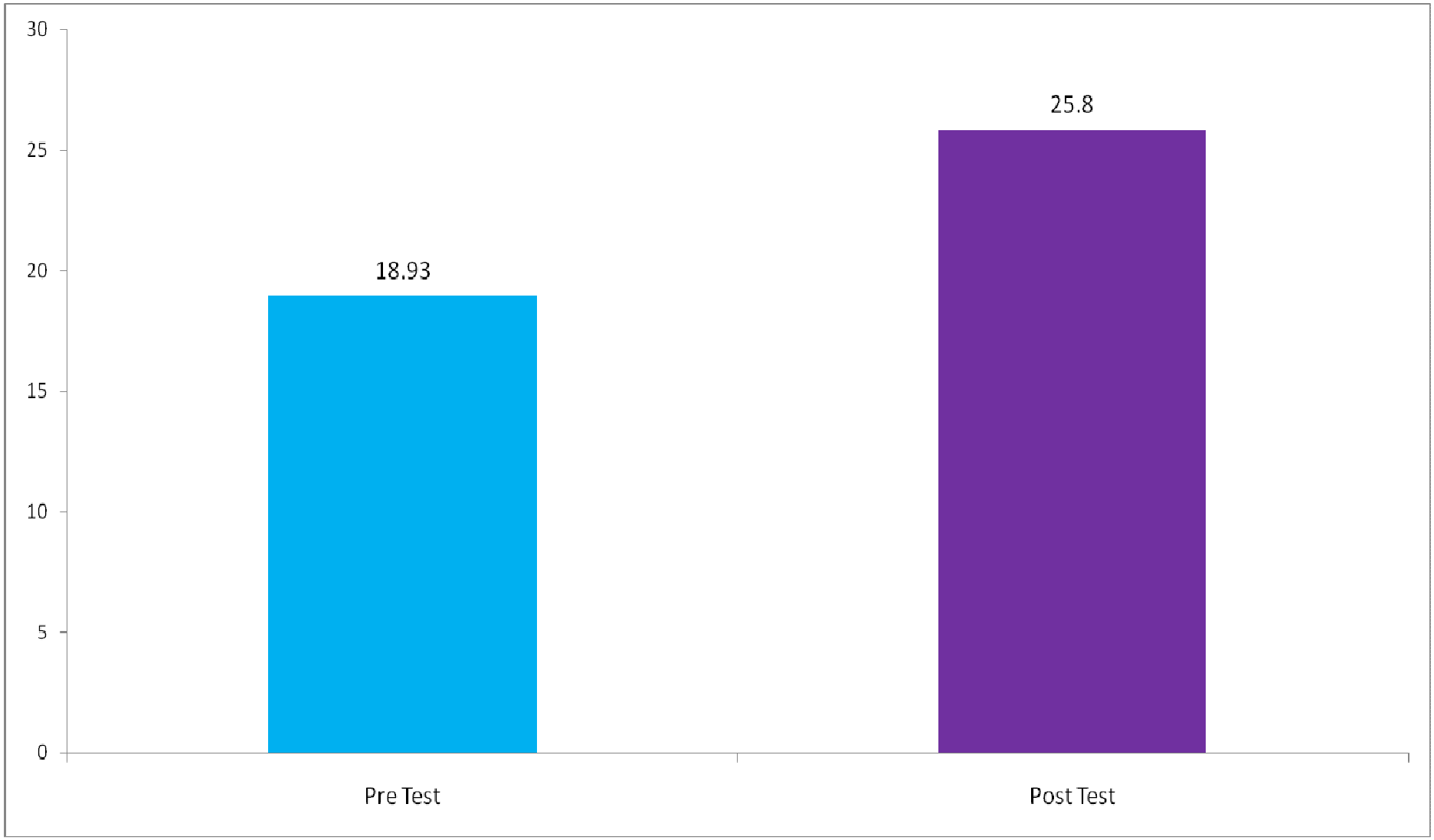
TABLE - 4

S.No.	Experimental Group	Mean	SD	"t" value	"p" value
1	Pre test	18.93	8.21	2.66	0.00624
2	Post test	25.8	5.63		

S = Significant

Table 4 and Graph 4 show the comparison between pre-test & post-test values in the experimental group. The mean values are 18.93 &25.8, "t" value is 2.66, "p" value is 0.00624 which is less than 0.05. Therefore there is significant difference between pre test and post test values of the praxis in experimental group.

GRAPH -IV : PRAXIS IN EXPERIMENTAL GROUP - PRE TEST VS POST TEST VALUES



DISCUSSION

The aim of the study was to determine the effectiveness of sensory motor therapy in dyspraxia among learning disabled children.

The present study was done with two groups - experimental and control group. 30 children of age group 6 to 9 years, both male and female were selected by convenient sampling procedure. Teacher's questionnaire about children with learning problems was administered to screen children with learning disability. Then BOT MP-Sf was administered to assess dyspraxia.

The experimental group underwent treatment for two sessions per week for 14 weeks. Sensory motor therapy was given to children with dyspraxia. Treatment included 28 sessions which was given in the form of competitive games. After the intervention period was over, the BOT MP -Sf was once again administered to both control and experimental groups. Results were compared with statistical technique "t" test.

Table 1 and Graph 1 shows the comparison of praxis between control and experimental group - pre test values. The mean values are 18.86 &18.93 with a "t" value .063,"p" value is 0.47. ($P > 0.05$) The table value of" t" is 2.05.The calculated value is less than the table value which

shows there is no significant difference between the pre test values of praxis between control and experimental group.

Table 2 and Graph 2 shows the comparison of praxis between control and experimental group - post test values. The mean values are 19.33 &25.8, "t" value is 2.38, "p" value is 0.012(P < 0.05). The table value of "t" is 2.05.The calculated value of "t" is greater than the table value. It shows that there is significant difference between the post test values of praxis between control and experimental group.

This is in congruence with the study conducted by Mats Niklasson, Irene Niklasson(2009) who found that the incidence of symptoms of dyspraxia and the level of severity of dysfunction of gross motor abilities decreased markedly after 3 years of intervention using the sensory motor approach. In this study,retraining for balance was utilized as a training program. The experimental group showed a marked improvement inpraxis. The study concluded that sensory motor therapy can be used as a complement to regular treatment of DCD. .

Table 3 and Graph 3 shows the comparison of praxis in control group - pre test vs post test values. The mean values are18.86&19.33, "t" value is 0.14,"p" value is 0.44 (P > 0.05) .The table value of "t" is 2.15. The calculated value is less than the table value which shows there is no

significant difference between the pre test and post test values of praxis in control group.

Table 4 and Graph 4 shows the comparison of praxis in experimental group - pre test vs post test values. The mean values are18.93 &25.8, "t" value is 2.66,"p" value is 0.00624($P < 0.05$). The table value of "t" is 2.15.The calculated value of "t" is greater than the table value which shows there is significant difference between the pre test and post test values of praxis in experimental group.

This is in congruence with the study conducted by Joan Vertes (2009) who did a small group sensory motor approach on children with DCD. Groups included 2-6children with one or two occupational therapists &are provided weekly for one hour in blocks of 6-8 sessions. Results were astounding and the sensory-motor group showed significant improvement in praxis skills.

Hence sensory motor therapy is effective for dyspraxia among learning disabled children which in turn paves the way for rejection of null hypothesis and acceptance of alternate hypothesis.

CONCLUSION

From this study, it can be concluded that:

- The experimental group which received sensory motor therapy showed significant improvement in praxis among learning disabled children as compared to control group. Hence it shows that dyspraxic symptoms have reduced after Sensory motor therapy.

LIMITATIONS

- This study is confined only to the age group of 6 to 9 years.
- Only children with learning disability were included for the study.
- Male and female comparison was not included in the study.
- Parent / caregiver session was not included in the study.

RECOMMENDATIONS

- Further study can be done with the age group > 9 years.
- ADHD with dyspraxia can be taken for the study.
- Male and female comparison can be included in this study
- Parent / care giver session can be included.
- This study can be done in a large sample.
- Duration of treatment shall be increased to produce more significant results.
- Further follow up study can be done.

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APPENDIX

APPENDIX - I

TEACHER'S QUESTIONNAIRE ABOUT CHILDREN WITH LEARNING PROBLEMS

Name of the Child Gender: M/F Date of Birth

Place of living Mother tongue

Father or Mother Occupation

Class Name of the Teacher School

Rating: (N= Never; S= Sometime; F= Frequently; A= Always)

S. No.	QUESTIONNAIRE	N	S	F	A
1	Does the child, finish his/her class work late than other children?				
2	Does the child have difficulty while copying from blackboard?				
3	Does the child make errors while copying from blackboard?				
4	Does the child make errors while copying from book?				
5	Does the child score less in mathematics?				
6	Does the child obtain fewer score in the class tests?				
7	Is the child is messy in Drawing / Craft work and Painting?				
8	Does the child have difficulty in completing the				

S. No.	QUESTIONNAIRE	N	S	F	A
	examination papers or the writing task?				
9	Does the child spend too much time on reading materials/books/paragraphs to understand?				
10	Does the child have difficulty in reading the text?				
11	Does the child have difficulty in reading his/her own handwriting?				
12	Does the child have difficulty in identifying letters d, b, p, q, n, m, B, 8 ?				
13	Does the child have difficulty in memorizing the content of reading material?				
14	Does the child have difficulty in narrating the story in multi steps/same sequence?				
15	Does the child get easily distracted to noise/visual stimuli while doing school work?				
16	Is the child less attentive in his/her class work?				
17	Does the child appear lost/day dreaming in the class?				
18	Does the child have difficulty being in group with other children?				

APPENDIX - II

MASTER CHART - EXPERIMENTAL GROUP

Subject Code	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Age	7	6	7	8	7	7	7	7	7	7	7	8	7	6	6
Sex	M	M	F	M	M	M	M	M	M	M	M	F	M	M	M
Pre Test	20	26	15	20	25	25	23	11	15	9	11	12	9	38	25
Post Test	28	26	24	30	34	29	24	20	25	18	21	22	19	38	29

MASTER CHART - CONTROL GROUP

Subject Code	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Age	6	6	6	6	6	6	6	7	8	6	7	9	7	9	6
Sex	F	F	F	F	F	F	F	M	M	F	M	F	M	M	F
Pre Test	19	27	14	21	24	26	24	10	16	8	10	11	8	38	27
Post Test	20	28	15	22	25	26	24	10	17	8	10	12	8	38	27